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PROJECT NO. 52373

REVIEW OF WHOLESALE ELECTRIC MARKET DESIGN - PUBLIC UTILITY COMMISSION

OF TEXAS

**ORMAT'S RESPONSE TO COMMISSION STAFF'S REQUEST FOR COMMENT ON MARKET DESIGN QUESTIONS**

Ormat submits this response to the Public Utility Commission of Texas ("PUCT" or "Commission") Staff's request for comment on questions concerning market design to assist Staff in preparing an agenda for the Commission's work sessions on Market Design.

**I. INTRODUCTION to Ormat**

Ormat has over five decades of experience in the development of state-of-the-art, environmentally sound power solutions. It is a leading geothermal and Energy Storage Independent Power Producer with the objective of becoming a leading global provider of renewable energy. Ormat Technologies, Inc. is listed for trading on the New York Stock Exchange [NYSE: ORA], with a market cap of approximately USD3.25 billion.

Ormat's current 1,015MW geothermal generating portfolio is spread globally in the U.S., Kenya, Guatemala, Indonesia, Honduras, and Guadeloupe.

Ormat also expanded its operations to provide energy storage and energy management solutions and currently owns and operates 83MW/176MWh of energy storage assets across PJM, ISONE, ERCOT and CAISO, and is in construction of five projects totaling 57 MW/ 82 MWh. In ERCOT, Ormat currently owns an operating energy storage facility with a capacity of 9.9MW, is in final construction phase of another facility of 25MW and is developing a pipeline of approximately 500MW of projects.

In addition to owning and operating geothermal and storage power plants in the United States and globally, Ormat designs, manufactures and sells power generating equipment as well as complete power plants on a turnkey basis to the leading energy players in the world.

**ORMAT TECHNOLOGIES, INC.**

6140 Plumas St. • Reno, NV 89519 • Telephone: (775) 356-9029 • Facsimile: (775) 356-9039

We are very pleased to offer our inputs into the PUCT Review of Wholesale Electric Market Design and we look forward to engaging in the process.

## II. RESPONSE TO MARKET DESIGN QUESTIONS

Question 1: What specific changes, if any, should be made to the Operating Reserve Demand Curve (ORDC) to drive investment in existing and new dispatchable generation? Please consider ORDC applying only to generators who commit in the day-ahead market (DAM). Should that amount of ORDC-based dispatchability be adjusted to specific seasonal reliability needs?

1. Battery Energy Storage System (BESS) are highly dispatchable with extremely fast ramp rates and ability to respond to frequency. With increasing amounts of intermittent renewable resources being built and consequent decrease in system inertia, the fast frequency response (FFR) provided by BESS is essential to arresting frequency in a timely manner to avoid shedding firm load by under-frequency relays and keeping the grid secure and reliable with the sudden loss of large generators. Typically, such drastic and precarious frequency drops are of short duration (less than 15 minutes) – thus, even a 15-minute duration BESS providing FFR is highly effective at arresting frequency particularly during low inertia situations when other resources do not respond fast enough. ERCOT studies have shown that just 450 MW of FFR can lower the critical inertia level from 100 gigawatt-seconds (GW•s) to 90 GW•s.

2. ERCOT's current practice of procuring about 8,000 MW of Ancillary Services (AS) implies there is significant reliability value for such quantities of operating reserves whereas the current ORDC reflects almost no value for reserves in excess of significantly lower amounts of operating reserves. Commission should consider adjusting the ORDC to reflect appropriate levels of operating reserves such as increasing the standard deviation used to determine the ORDC. Such a change to the ORDC would incentivize investment in existing and new dispatchable resources, including BESS.

3. ERCOT Day-Ahead Market (DAM) is a voluntary financial market with possible physical commitment to provide services in real-time being limited to AS. Any change to require physical commitment for energy in DAM would be inefficient and may adversely impact grid reliability due to resource limitations such as emissions, fuel, storage capacity, etc.

4. The ORDC should reflect seasonable reliability needs in its design.

Question 2: Should ERCOT require all generation resources to offer a minimum commitment in the day-ahead market as a precondition for participating in the energy market?

a. If so, how should that minimum commitment be determined?

b. How should that commitment be enforced?

1. As described above, ERCOT should not require generation resources to offer a minimum commitment in the day-ahead market as a precondition for participating in the energy market. Such a change would likely cause severe reliability issues for the ERCOT grid due to resource limitations such as emissions, fuel, storage capacity, etc.

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Question 3: What new ancillary service products or reliability services or changes to existing ancillary service products or reliability services should be developed or made to ensure reliability under a variety of extreme conditions? Please articulate specific standards of reliability along with any suggested AS products. How should the costs of these new ancillary services be allocated.

Ormat would suggest the following changes to existing ancillary service products or reliability services to ensure reliability under a variety of extreme conditions:

1. Slightly modify RRS to ensure that RRS is purely a frequency responsive service that is not released to SCED for energy deployment.
2. Eliminate the financial disincentive to providing critically important FFR service by not prorating FFR awards with load resources providing RRS.
3. Implement staggered frequency triggers for FFR to address any overshoot concerns.
4. Consider making ONSC (ON Synchronous Condenser) status technology neutral to allow ESRs to offer RRS using ONSC status.

Question 4: Is available residential demand response adequately captured by existing retail electric provider (REP) programs? Do opportunities exist for enhanced residential load response?

No comment.

Question 5: How can ERCOT's emergency response service program be modified to provide additional reliability benefits? What changes would need to be made to Commission rules and ERCOT market rules and systems to implement these program changes?

No comment.

Question 6: How can the current market design be altered (e.g., by implementing new products) to provide tools to improve the ability to manage inertia, voltage support, or frequency?

Changes to the current market design are described in the answers to Question 3 above.

Respectfully submitted,



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Michael Jungreis  
Business Development Director  
Ormat Technologies Inc.

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